What is claimed is:

1. An isolated lipid binding domain comprising the sequence

WxxDxxxxxCxxCxxxx(A/T)uuj(R/K)(R/K)HHCR(A/G/V)CxxxxCxxCxxxxxxxx xxuuuxuuRVCxxCx (SEQ ID NO:1),

wherein x is any amino acid; u is a highly hydrophobic residue; and j is a positively charged residue.

2. The lipid binding domain of claim 1, wherein u is F, V, I, L, M, or W.

3. The lipid binding domain of claim 1, wherein j is R or K.

4. The lipid binding domain of claim 1, wherein each x is selected to be the same as a corresponding amino acid in SARA protein.

5. The lipid binding domain of claim 1, where the sequence comprises the FYVE sequence of the SARA protein (SEQ ID NO:10).

6. The lipid binding domain of claim 1, wherein the domain comprises a synthetic sequence.

7. The lipid binding domain of claim 1, where the domain comprises a peptoid sequence.

8. The lipid binding domain of claim 1, where the domain comprises a peptidomimetic sequence.

9. The lipid binding domain of claim 1, where the domain comprises a Turret loop selected from the group consisting of: AFFR (SEQ ID NO:14), AFIR (SEQ ID NO:15),

AIFR (SEQ ID NO:16), AFFK (SEQ ID NO:17), AFIK (SEQ ID NO:18), AIFK (SEQ ID NO:19), and TFTK (SEQ ID NO:20).

10. The lipid binding domain of claim 1, wherein u is Y, M, T, or F.

11. A lipid binding molecule comprising

(a) a lipid binding domain of claim 1; and

(b) a reporter group linked to the lipid binding domain.

12. The lipid binding molecule of claim 11, wherein the lipid binding domain binds to phosphatidylinositol 3-phosphate.

13. The lipid binding molecule of claim 11, wherein the lipid binding domain binds to phosphatidylinositol 3-phosphate on an endosome.

14. The lipid binding molecule of claim 11, wherein the lipid binding domain binds to phosphatidylinositol 3-phosphate on a liposome.

15. The lipid binding molecule of claim 11, wherein the reporter group binds to a substrate.

16. The lipid binding molecule of claim 11, wherein the reporter group comprises one member of a binding pair, and wherein a substrate comprises a second member of the binding pair.

17. The lipid binding molecule of claim 11, wherein the reporter group is selected from the group consisting of glutathione-S-transferase (GST), His X6 (6His), FLAG, Green Fluorescent Protein, chitin binding protein, cellulase, maltose binding protein, dihydrofolate reductases, FK506 binding protein (FKBP), FKBPF36V, an antibody, a fluorescently labeled antibody, and an antibody fragment.

18. The lipid binding molecule of claim 11, wherein the reporter group comprises a fluorescent moiety.

19. The lipid binding molecule of claim 18, wherein the fluorescent moiety comprises GFP.

20. A method for detecting a lipid within a lipid bilayer in a sample, the method comprising:

a) obtaining a lipid binding molecule of claim 11;

b) mixing the lipid binding molecule with the sample under conditions that enable the lipid binding molecule to bind to a lipid in the sample to form a complex; and

c) detecting the complex as an indication of the presence of the lipid in the sample.

21. The method of claim 20, wherein the lipid comprises phosphatidylinositol 3-phosphate.

22. The method of claim 20, wherein the lipid binding domain comprises a SARA FYVE domain.

23. The method of claim 20, wherein the lipid binding domain comprises naturally occurring amino acids.

24. The method of claim 20, wherein the lipid binding domain comprises synthetic amino acids.

25. The method of claim 20, wherein the reporter group comprises glutathione S-transferase.

26. The method of claim 20, wherein the lipid comprises a cellular lipid membrane.

27. The method of claim 26, wherein the cellular lipid membrane comprise an endosome.

28. A method of locating a lipid-containing cellular organelle within a cell, the method comprising

a) obtaining a lipid binding molecule of claim 11;

b) applying the lipid binding molecule to the cell under conditions that enable the lipid binding molecule to enter the cell; and

c) detecting the reporter group of the lipid binding molecule, whereby the location of the reporter group within the cell indicates the location of the cellular organelle.

29. The method of claim 28, wherein the method is performed in vivo.

30. The method of claim 28, wherein the method is performed in vitro.

31. The method of claim 28, wherein the cellular organelle comprises phosphatidylinositol 3-phosphate.

32. The method of claim 28, wherein the cellular organelle is an endosome.

33. The method of claim 32, wherein the endosome comprises a phagosome.

34. The method of claim 28, wherein the cellular organelle is a liposome.

35. The method of claim 28, wherein the reporter group provides a visual signal and the method further comprises visualizing the location of the cellular organelle.

36. A method of diagnosing a subject for infection by a microorganism, the method comprising

a) obtaining a cell from the subject;

b) binding a lipid binding molecule of claim 11 to a phagosome in the cell;

c) visualizing the reporter group on a phagosome; and

d) determining whether the phagosome is capable of fusing to a lysosome, wherein a phagosome that cannot fuse to a lysosome indicates that the cell is infected by a microorganism.

37. The method of claim 36, wherein the microorganism is *Mycobacterium tuberculosis*.

38. The method of claim 36, wherein the cell is derived from a subject at risk for infection by the microorganism.

39. The method of claim 36, wherein the subject is a mammal

40. The method of claim 36, wherein the subject is a human.

41. A method of determining whether a test compound is a candidate compound for treating *Mycobacterium tuberculosis*, the method comprising

a) binding a lipid binding molecule of claim 11 to a phagosome in a cell infected by *M. tuberculosis*;

b) applying a test compound to the infected cell; and

c) visualizing the phagosome before and after application of the test compound; wherein a phagosome that is capable of fusing to a lysosome after application of the test compound indicates that the test compound is a candidate compound to treat *M. tuberculosis*.

42. The method of claim 41, wherein the infected cell is a cultured cell.

43. The method of claim 41, wherein the infected cell is derived from a subject.

44. The method of claim 41, wherein the subject is a mammal.

45. The method of claim 41, wherein the subject is a human.

46. The method of claim 41, wherein the reporter group is visible by microscopy.

47. The method of claim 41, wherein the reporter group comprises a fluorescent compound.